

## ОПТИКА И ЛАЗЕРНАЯ ФИЗИКА

**DUAL-FUNCTIONAL MATERIAL  
FOR TUNABLE COLOR OPTICAL THERMOMETRY:  
Er<sup>3+</sup>/Yb<sup>3+</sup> CO-DOPED Lu<sub>2</sub>Ge<sub>2</sub>O<sub>7</sub> EMITTING RED  
AND GREEN LIGHT UNDER 980 nm/1550 nm EXCITATION**

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*While rare-earth ions have found extensive applications as dopants in up-conversion luminescent materials across various fields, empirical observations reveal distinct influences of different dopants on diverse substances. In light of this, we successfully synthesized dual-mode excitation Lu<sub>2</sub>Ge<sub>2</sub>O<sub>7</sub> up-conversion phosphors doped with Yb<sup>3+</sup>/Er<sup>3+</sup> ions (Lu<sub>2</sub>Ge<sub>2</sub>O<sub>7</sub>:Yb<sup>3+</sup>/Er<sup>3+</sup>). These phosphors are designed to exhibit two distinct emission colors, green and red, under excitation at 980 nm or 1550 nm. Our research delves into a comprehensive analysis of the potential up-conversion mechanisms, considering different excitation sources at wavelengths of 980 nm and 1550 nm. Our results unambiguously demonstrate that doping with Er<sup>3+</sup> and Yb<sup>3+</sup> ions can alter the optical properties of Lu<sub>2</sub>Ge<sub>2</sub>O<sub>7</sub>, resulting in the tunable color and optical thermometry capabilities. This material exhibits promising prospects in diverse fields such as fluorescent anti-counterfeiting and temperature sensing.*

**Keywords:** temperature sensing, up-conversion luminescence, infrared radiator, optical window material, Lu<sub>2</sub>Ge<sub>2</sub>O<sub>7</sub>.

Поступила в редакцию 16 мая 2024 г.

После доработки 18 октября 2024 г.

Принята к публикации 22 октября 2024 г.

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